St. Gobain

1 Introduction

Saint-Gobain Containers, Inc. (SGCI) operates a glass container manufacturing facility located in Dolton, Illinois (see Figure 1). The facility (I.D. No. 031069AAI) is authorized to operate under CAAPP Permit No. 95090177, issued on June 26, 2001, by the Illinois Environmental Protection Agency (IEPA), as a major source of nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter (PM). The Dolton plant is located in Cook County, which is designated as attainment with the National Ambient Air Quality Standards (NAAQS) for all pollutants except for ozone (moderate nonattainment for the 8-hour standard) and fine particulate matter known also as $PM_{2.5}$ (nonattainment with the 24-hour standard). The facility is an existing major source under Prevention of Significant Deterioration (PSD) permitting requirements, since emissions of at least one attainment pollutant exceed the PSD major source threshold. It is also a major source under Nonattainment New Source Review (NNSR) permitting requirements for ozone and for $PM_{2.5}$.

SGCI is submitting this application for a construction permit according to the requirements in 35 Illinois Administrative Code (IAC) 201.152 to authorize the upcoming modification of Furnaces #1, #2, and #3 at the Dolton facility. The proposed project will include the installation of emission controls including a dry scrubber, electrostatic precipitator (ESP), and selective catalytic reduction (SCR) to control SO_2, PM, and NO_x emissions, respectively, from the Furnaces. At this time SGCI is considering the use of an integrated ceramic filter system (ceramic filter technology with upstream alkali injection) to achieve SO_2, PM, and NO_x emission reductions in lieu of the dry scrubber, ESP, and SCR represented in this application. SGCI recently received approval for the use of alternative technology from USEPA Region V (a copy of the approval letter is located in Appendix C). If an alternative technology is chosen, then SGCI will amend this application with the new control equipment information and any revisions to process monitoring parameters that are needed. A change in the proposed emission control technology would not affect the post-project emission rates as they are currently described.

In addition to the installation of controls, the project will include rebuilds of Furnaces #1 and #3 and the delimiting of the existing production capacity limit placed on Furnace #2. As a result of this project, Furnace #1 will increase in capacity from 255 tpd to 383 tpd. The design capacity of Furnace #2 will not be increased, however SGCI is requesting the removal of the capacity limit previously imposed on Furnace #2 under permit 11100030, issued May 7, 2012. Furnace #3 will remain at the current design capacity. The increase in emissions related to the project will be below the levels triggering NNSR or PSD permitting requirements.

SGCI entered into a global consent decree with USEPA and several states, including Illinois, which was entered by the United States District Court for the Western District of Washington at Seattle on May 7, 2010 (the "GCD"). SGCI also seeks to incorporate certain requirements and limitations enumerated in the GCD for Furnaces #1, #2, and #3 into the construction permit issued for this project. Under the GCD, SGCI is required to operate the proposed dry scrubber, ESP, and SCR or alternative emission controls no later than December 31, 2014.

2 Facility and Source Description

The Dolton facility is a glass manufacturing plant with three regenerative, natural gas-fired glass melting furnaces. A process flow diagram for the furnace operations is included in Figure 2.

Raw materials, including silica (sand), limestone, soda ash, cullet (recycled glass), and lesser quantities of refining agents, colorants, and decolorizers are received at the site and unloaded into the material handling system. Generally, the aggregate raw materials are first transferred to a receiving hopper and then sent to storage silos via a bucket elevator. Cullet is obtained both on-site from recycled scrap and off-site from third party recycling centers and other similar sources. From the storage silos, the raw materials are transferred through a gravity feed system to a weigh hopper before being combined according to the batch specification in a mixer, thoroughly mixed, and conveyed to storage bins above the furnace. The combined material is then continuously fed into the furnaces via the furnace feeders. The raw material feed operation is automated such that a preset level of molten glass is maintained in the furnaces.

In the Furnace melters, the raw materials are melted into molten glass. Heat to maintain the glass in a molten state is supplied by natural gas and submerged electrodes (electric boost). The Dolton Furnaces are each a regenerative type, where the furnace firing occurs in cycles in order to recover waste heat. During the first cycle, the furnace exhaust is routed through a set of regenerator chambers lined with checker bricks on one side of the furnace. The bricks recover residual heat from the furnace exhaust. During the second phase, the exhaust flow is reversed and the incoming combustion air is passed through the heated regenerator chambers so it is pre-heated before entering the melter. During each cycle, the exhaust gases are routed to a stack which emits to the atmosphere. Each Furnace currently vents through two stacks (one for each firing cycle), but as a result of this project the three furnace exhausts will be combined and routed through the planned emission controls prior to discharge through a single stack.

As raw material enters each furnace melter, it floats on top of the molten glass already in the furnace. The material subsequently melts into molten glass, and is refined (removal of trapped gases and bubbles) and homogenized within the melter. Nearly bubble-free molten glass is continually withdrawn from each furnace into the distributor and then flows through shallow refractory channels called forehearths, each of which leads to one of the two individual glass container production lines, or "shops", associated with each of the furnaces (Shops #11 and #12, #21 and #22, and #31 and #32, respectively). The distributor and forehearths are natural gas-fired to provide heat conditioning and temperature control of the molten glass during transfer.

From each forehearth, the glass is cut into sections (gobs) by a set of shears. The gobs enter the Individual Section (IS) glass forming machines, where each gob is formed into a glass container within a mold. A mold swabbing compound is applied to the mold surface to keep the glass from sticking. After the containers are formed and released from the molds, they are conveyed to an exterior coating operation (hot end coating), where an organotin compound is applied to the container exteriors to strengthen the glass and prevent abrasions. The containers are then conveyed through natural gas-fired annealing lehrs (one for each shop), which reheat the containers slightly then cool them at a controlled rate. This process removes unwanted stress created in the forming process and promotes container strength.

Once cooled, the containers are inspected, packed, and shipped to customers. Damaged or off-spec containers are transferred to the batch plant to be recycled back into the process as cullet after crushing.

3.5 GCD Requirement Incorporation

As mentioned in Section 1, SGCI entered into a GCD on May 7, 2010. Whenever SGCI is required to obtain a Permit for the purpose of complying with the GCD, the GCD specifies that the permitting agency shall "...include in the Permit for the installation of control devices, monitoring devices and the contemporaneous Furnace rebuild project the emission controls, emission limits, averaging periods, monitoring requirements, compliance determination, and compliance schedule set forth..." in the GCD [GCD, Section VIII.30]. Since the proposed project will trigger certain requirements and limitations enumerated in the GCD, SGCI requests that these requirements and limitations be incorporated into the construction permit and operating permit issued for this project.

Pursuant to these GCD provisions, Section 6 of this application provides a listing of the permit conditions SGCI proposes to satisfy the requirements of the GCD that apply to the Dolton Furnaces.

4 Project Emissions

Because the proposed project involves the modification of the Dolton Furnaces and associated emission units as well as the addition of new emission units (the emergency generator, the soda ash silo and the ESP dust silo), the resulting changes in emissions were estimated to determine the project emissions increases and to confirm that the PSD and NNSR permitting requirements are not applicable. A summary of the project emissions increase for each pollutant is provided in Table 1. Detailed emission estimates and a compilation of the emission factors used to calculate emissions are provided in Appendix B.

Baseline Actual Emissions of pollutants that are regulated under PSD (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) and Past Actual Emissions of pollutants that are regulated under NNSR (NO_x, $PM_{2.5}$, SO_2 as a $PM_{2.5}$ precursor, and VOM) were calculated using the facility's average annual production rates (tons pulled) during the 24-month period from January 2010 through December 2011. The Baseline Actual/Past Actual emission calculations are provided on page 13 of Appendix B. Furnace emissions were determined using the applicable glass pull rate, combined with emission factors either developed from stack testing data or taken from AP-42, as described below.

Pollutant	Pre-project Furnace Emission Factor Basis
PM / PM_{10} / $PM_{2.5}$	Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace prior to or during the baseline period (tests conducted 09/2009 and 07/2011). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative furnaces across SGCI's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). All CPM is assumed to be PM_{10} and $PM_{2.5}$. PM_{10} and $PM_{2.5}$ factors also assume that 95% of FPM is FPM_{10} and 91% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3 for an uncontrolled furnace.
SO_2	Emission factors are based on the stack tests performed at each Furnace during the baseline period (tests conducted 09/2009 and 07/2011). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.
NO_x	Furnace #1 emission factor is based on compliance testing performed 06/2008, since subsequent NO_x testing has not been performed. The Furnace #2 and #3 NO_x emission factors are based on the stack tests performed at each Furnace prior to or during the baseline period (tests conducted 09/2009 and 07/2011). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.
H_2SO_4 mist	Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SCGI's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.
VOM, CO	Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

Baseline Actual/Past Actual emissions from the associated distributor, forehearths, and lehrs were estimated from fuel usage data and published AP-42 emission factors for natural gas combustion (Tables 1.4-1 and 1.4-2). Baseline Actual/Past Actual emissions from mold swabbing, hot end coating, material handling, and the batch mixers were estimated based on the past material consumption data and emission factors for these operations.

Future Projected Actual Emissions of pollutants that are regulated under PSD and Future Permitted Emissions of pollutants that are regulated under NNSR were calculated based on Furnace #1 increasing its design capacity by 50% and Furnace #2 and Furnace #3 operating without a change to their current design capacities. The Future Projected Actual/Future Permitted emission calculations are provided on page 14 of Appendix B. Furnace emissions were determined using the applicable glass pull rate, combined with the emission factors reflecting the ESP, dry scrubber, and SCR controls as described below.

Pollutant	Post-project Furnace Emission Factor Basis
PM / PM_{10} / $PM_{2.5}$	Post-project emission factors for FPM from each Furnace are based on the GCD limit [IV.9.c]. TPM factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM_{10} and $PM_{2.5}$ factors also assume that 75% of FPM is FPM_{10} and 53% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3 for an ESP-controlled furnace.
SO_2	Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO_2 concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, based on the inlet SO_2 concentrations at each Furnace taken from the most recent stack test results.
NO_x	As specified by GCD, IV.7.d.ii.
H_2SO_4 mist	Post-project emission factor is based on recent stack testing results of other SGCI furnaces with SO_2 controls while accounting for expected variability of furnace operation.
VOM, CO	Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

Future Projected Actual/Future Permitted emissions from the associated distributor, forehearths, and lehrs were estimated from the post-project natural gas use (increased from their baseline rates in proportion to the increase in pre- to post-project furnace production) and published AP-42 emission factors for natural gas combustion (Tables 1.4-1 and 1.4-2). Future Projected Actual/Future Permitted emissions from mold swabbing, hot end coating, material handling, and the batch mixers were estimated based on the post-project material consumption (also increased from their baseline rates in proportion to the increase in pre- to post-project furnace production) and the respective emission factors for these operations.

Future Projected Actual/Future Permitted emissions of particulate were calculated for the proposed scrubber silo and ESP dust silo using emission factors from AP-42, Table 11.26-1 for storage bin loading. The emission estimates conservatively assume that PM_{10} and $PM_{2.5}$ emissions are equivalent to total PM emissions. The material throughput for the soda ash reagent stored in the scrubber silo assumes that the reagent will be injected at a level 50% greater than the stoichiometrically required amount for the expected pre-control SO_2 emissions. The material throughput for the ESP dust silo conservatively assumes that the entire amount of sodium sulfate formed in the dry scrubber and excess soda ash reagent injected into the dry scrubber will be removed by the ESP in addition to the Furnace PM emissions.

Future Projected Actual/Future Permitted emissions for the proposed emergency generator were calculated based on an annual operating time of 500 hr/yr according to guidance provided by USEPA ("Calculating Potential to Emit for Emergency Generators" (September 6, 1995). PM, NO_x, and CO emissions were calculated using factors corresponding to the allowable limits for Tier 2 engines at 40 CFR 60.4202(a)(2). NO_x emissions conservatively assume that the NO_x emission factor is equal to the non-methane hydrocarbon plus NO_x Tier 2 limit, and the VOM factor is based on the Tier 1 allowable limit for total hydrocarbons.

Exhibit 270-1
Applicable Rules Summary - Emergency Generator
Saint-Gobain Containers, Inc.
Dolton, Illinois

Emissions Standards or Limitations Applicable to the Emission Unit

Regulated Air Pollutant(s)	*Emission Standard(s)*	*Requirement(s)*
NOx, PM, CO, VOM, SO_2	40 CFR 60.4205(b)	Meet the applicable emission standards of 40 CFR 89.112 and 89.113 as follows: PM: 0.20 g/kW-hr, CO: 3.5 g/kW-hr; NOx + NMHC: 6.4 g/kW-hr; opacity: 20% during acceleration mode, 15% during lugging mode, 50% during peaks in either acceleration or lugging mode
NOx, PM, CO, VOM, SO_2	40 CFR 60.4207(a) and (b)	Use diesel fuel certified to the standards in 40 CFR 80.510(b)
NOx, PM, CO, VOM, SO_2	40 CFR 60.4211(a); 40 CFR 60.4206	Operate and maintain the engine according to manufacturer's written instructions or procedures developed by the owner or operator that are approved by the engine manufacturer over the life of the engine; only change those settings that are permitted by the manufacturer.
NOx, PM, CO, VOM, SO_2	40 CFR 60.4211(c)	Comply with emission standards by purchasing a certified engine. Install and configure the engine according to the manufacturer's specifications
NOx, PM, CO, VOM, SO_2	40 CFR 60.4211(e)	Maintenance checks and readiness testing limited to 100 hours per year; No limit on the use of the engine in emergency situations.
HAPs	40 CFR 63.6590(c)	For new stationary RICE located at an area source of HAP, meet MACT Subpart ZZZZ requirements by meeting the requirements of 40 CFR 60 Subpart IIII. No further requirements under Subpart ZZZZ apply.

Recordkeeping Rules Applicable to the Emission Unit

Regulated Air Pollutant(s)	*Recordkeeping Rule(s)*	*Requirement(s)*
N/A		

Reporting Rules Applicable to the Emission Unit

Regulated Air Pollutant(s)	*Reporting Rule(s)*	*Requirement(s)*
N/A		

Monitoring Rules Applicable to the Emission Unit

Regulated Air Pollutant(s)	*Monitoring Rule(s)*	*Requirement(s)*
NOx, PM, CO, VOM, SO_2	40 CFR 60.4209(a)	Install a non-resettable hour meter prior to startup of the engine

Testing Rules Applicable to the Emission Unit

Regulated Air Pollutant(s)	*Testing Rule(s)*	*Requirement(s)*
N/A		

Appendix B

Emission Estimates

ENVIRON

Saint-Gobain Containers, Inc.
Dolton Furnace #1 & #2 & #3 Modifications
PSD/NNSR Applicability Analysis

Signature: *MMW*
Checked by: *JGB/BED*

Date Calc Made Final: *9/13/2012*
Page: *1*

Pollutant	Project-Related Emissions Increase (tpy)	PSD/NNSR Significance Threshold (tpy)	Netting Analysis Required? (yes/no)	Net Emissions Increase/Decrease (tpy)	Major Modification? (yes/no)
PM	10.69	25	NO	NA	NO
PM_{10}	9.11	15	NO	NA	NO
NO_2[1]	9.85	40	NO	NA	NO
CO	20.43	100	NO	NA	NO
H_2SO_4 Mist	0.00	7	NO	NA	NO
CO_2e[2]	47,236	75,000	NO	NA	NO
GHG[2]	47,199	0	NO	NA	NO
NO_X	9.85	40	NO	NA	NO
VOM	13.86	40	NO	NA	NO
SO_2	1.60	40	NO	NA	NO
$PM_{2.5}$	9.03	10	NO	NA	NO

Notes:
[1] The review for NO_2 is performed using total NO_X, which provides a conservative analysis. NO_2 is anticipated to be a small fraction of NO_X.
[2] For GHG and CO_2e emissions, netting is only required if *both* CO_2e and GHG emissions are greater than the applicable threshold.

ENVIRON

Saint-Gobain Containers, Inc.
Dolton Furnace #1 & #2 & #3 Modifications
Project-Related PM Emission Changes

Signature: MMW
Checked by: JGB/BED

Date Calc Made Final: 9/13/2012
Page: 2

Source	Baseline or Past Actual Emissions (tpy)[1,2]	Post-Project Emissions (tpy)[3,4]	Project-Related Emissions Increase/Decrease (tpy)[5]
Furnace No. 1	18.74	20.27	1.53
Furnace No. 2	18.54	16.86	-1.67
Furnace No. 3	21.28	14.78	-6.50
Distributors/Forehearths - #1	0.28	0.54	0.26
Distributors/Forehearths - #2	0.24	0.38	0.13
Distributors/Forehearths - #3	0.27	0.36	0.10
Material Handling	0.01	0.02	0.01
Lehrs - Furnace #1	0.03	0.06	0.03
Lehrs - Furnace #2	0.03	0.05	0.02
Lehrs - Furnace #3	0.04	0.05	0.01
Mold Swab - Furnace #1	3.90	7.43	3.53
Mold Swab - Furnace #2	3.57	5.53	1.97
Mold Swab - Furnace #3	3.91	5.35	1.45
Hot End Coating - Furnace #1	0.84	1.59	0.76
Hot End Coating - Furnace #2	0.76	1.19	0.42
Hot End Coating - Furnace #3	0.83	1.14	0.31
Mixers - Furnace #1	1.24	1.28	0.05
Mixers - Furnace #2	1.23	1.25	0.02
Mixers - Furnace #3	1.23	1.25	0.02
Emergency Generator	0	0.08	0.08
Scrubber Silo	0	0.002	0.002
ESP Dust Silo	0	0.005	0.005
		Project-Related Increases:	10.69
		Project-Related Decreases:	-8.17
		Significance Threshold:	25
		Netting Analysis Required?	NO

[1] Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, $PM_{2.5}$, SO_2, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

[2] The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM_{10} / $PM_{2.5}$: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGCI's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM_{10} and $PM_{2.5}$ factors also assume that 95% of FPM is FPM_{10} and 91% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3.

SO_2: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NOx: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NOx testing has not been performed on the Furnace. The Furnace 2 and 3 NOx emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H_2SO_4 mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SCGI's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[3] Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NOx, $PM_{2.5}$, SO_2, and VOM) are future permitted emissions.

[4] Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1 , #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM_{10} / $PM_{2.5}$: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM_{10} and $PM_{2.5}$ factors also assume that 75% of FPM is FPM_{10} and 53% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO_2: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO_2 concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO_2 concentrations at each Furnace taken from the most recent stack test results.

NOx: As specified by GCD, IV.7.d.ii.

H_2SO_4 mist: Post-project emission factor is based on recent stack testing results of other SGCI Furnaces with SO_2 controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[5] Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)
Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON

Saint-Gobain Containers, Inc.
Dolton Furnace #1 & #2 & #3 Modifications
Project-Related PM_{10} Emission Changes

Signature: *MMW* Date Calc Made Final: *9/13/2012*
Checked by: *JGB/BED* Page: *3*

Source	Baseline or Past Actual Emissions (tpy)[1,2]	Post-Project Emissions (tpy)[3,4]	Project-Related Emissions Increase/Decrease (tpy)[5]
Furnace No. 1	17.97	16.76	-1.20
Furnace No. 2	17.78	14.31	-3.47
Furnace No. 3	20.42	12.32	-8.10
Distributors/Forehearths - #1	0.28	0.54	0.26
Distributors/Forehearths - #2	0.24	0.36	0.13
Distributors/Forehearths - #3	0.27	0.36	0.10
Material Handling	0.01	0.02	0.01
Lehrs - Furnace #1	0.03	0.06	0.03
Lehrs - Furnace #2	0.03	0.05	0.02
Lehrs - Furnace #3	0.04	0.05	0.01
Mold Swab - Furnace #1	3.90	7.43	3.53
Mold Swab - Furnace #2	3.57	5.53	1.97
Mold Swab - Furnace #3	3.91	5.35	1.45
Hot End Coating - Furnace #1	0.84	1.59	0.76
Hot End Coating - Furnace #2	0.76	1.19	0.42
Hot End Coating - Furnace #3	0.83	1.14	0.31
Mixers - Furnace #1	1.21	1.23	0.02
Mixers - Furnace #2	1.21	1.22	0.01
Mixers - Furnace #3	1.21	1.22	0.01
Emergency Generator	0	0.08	0.08
Scrubber Silo	0	0.002	0.002
ESP Dust Silo	0	0.005	0.005
		Project-Related Increases:	9.11
		Project-Related Decreases:	-12.77
		Significance Threshold:	15
		Netting Analysis Required?	NO

[1] Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, $PM_{2.5}$, SO_2, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

[2] The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM_{10} / $PM_{2.5}$: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGCI's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM_{10} and $PM_{2.5}$ factors also assume that 95% of FPM is FPM_{10} and 91% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3.

SO_2: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NOx: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NOx testing has not been performed on the Furnace. The Furnace 2 and 3 NOx emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H_2SO_4 mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SCGI's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[3] Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NOx, $PM_{2.5}$, SO_2, and VOM) are future permitted emissions.

[4] Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1 , #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM_{10} / $PM_{2.5}$: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM_{10} and $PM_{2.5}$ factors also assume that 75% of FPM is FPM_{10} and 53% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO_2: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO_2 concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO_2 concentrations at each Furnace taken from the most recent stack test results.

NOx: As specified by GCD, IV.7.d.ii.

H_2SO_4 mist: Post-project emission factor is based on recent stack testing results of other SGCI Furnaces with SO_2 controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[5] Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)
Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON

Saint-Gobain Containers, Inc.
Dolton Furnace #1 & #2 & #3 Modifications
Project-Related $PM_{2.5}$ Emission Changes

Signature: *MMW* Date Calc Made Final: *9/13/2012*
Checked by: *JGB/BED* Page: *4*

Source	Baseline or Past Actual Emissions (tpy)[1,2]	Post-Project Emissions (tpy)[3,4]	Project-Related Emissions Increase/Decrease (tpy)[5]
Furnace No. 1	17.36	13.70	-3.66
Furnace No. 2	17.18	12.06	-5.12
Furnace No. 3	19.73	10.15	-9.57
Distributors/Forehearths - #1	0.28	0.54	0.26
Distributors/Forehearths - #2	0.24	0.38	0.13
Distributors/Forehearths - #3	0.27	0.36	0.10
Material Handling	0.01	0.02	0.01
Lehrs - Furnace #1	0.03	0.06	0.03
Lehrs - Furnace #2	0.03	0.05	0.02
Lehrs - Furnace #3	0.04	0.05	0.01
Mold Swab - Furnace #1	3.90	7.43	3.53
Mold Swab - Furnace #2	3.57	5.53	1.97
Mold Swab - Furnace #3	3.91	5.35	1.45
Hot End Coating - Furnace #1	0.84	1.59	0.76
Hot End Coating - Furnace #2	0.76	1.19	0.42
Hot End Coating - Furnace #3	0.83	1.14	0.31
Mixers - Furnace #1	1.188	1.192	0.003
Mixers - Furnace #2	1.188	1.190	0.002
Mixers - Furnace #3	1.188	1.190	0.001
Emergency Generator	0	0.083	0.083
Scrubber Silo	0	0.002	0.002
ESP Dust Silo	0	0.005	0.005
		Project-Related Increases:	9.08
		Project-Related Decreases:	-18.36
		Significance Threshold:	10
		Netting Analysis Required?	NO

[1] Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, $PM_{2.5}$, SO_2, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

[2] The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM_{10} / $PM_{2.5}$: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 16.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGCI's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM_{10} and $PM_{2.5}$ factors also assume that 95% of FPM is FPM_{10} and 91% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3.

SO_2: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NOx: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NOx testing has not been performed on the Furnace. The Furnace 2 and 3 NOx emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H_2SO_4 mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SCGI's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[3] Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NOx, $PM_{2.5}$, SO_2, and VOM) are future permitted emissions.

[4] Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1 , #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM_{10} / $PM_{2.5}$: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM_{10} and $PM_{2.5}$ factors also assume that 75% of FPM is FPM_{10} and 53% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO_2: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO_2 concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO_2 concentrations at each Furnace taken from the most recent stack test results.

NOx: As specified by GCD, IV.7.d.ii.

H_2SO_4 mist: Post-project emission factor is based on recent stack testing results of other SGCI Furnaces with SO_2 controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[5] Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)
Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON

Saint-Gobain Containers, Inc.
Dolton Furnace #1 & #2 & #3 Modifications
Project-Related SO_2 Emission Changes

Signature: *MMW* Date Calc Made Final: *9/13/2012*
Checked by: *JGB/BED* Page: 5

Source	Baseline or Past Actual Emissions (tpy)[1,2]	Post-Project Emissions (tpy)[3,4]	Project-Related Emissions Increase/Decrease (tpy)[5]
Furnace No. 1	37.02	38.58	1.56
Furnace No. 2	48.83	41.45	-7.37
Furnace No. 3	71.60	53.71	-17.89
Distributors/Forehearths - #1	0.02	0.04	0.02
Distributors/Forehearths - #2	0.02	0.03	0.01
Distributors/Forehearths - #3	0.02	0.03	0.01
Lehrs - #1	0.002	0.004	0.002
Lehrs - #2	0.002	0.004	0.001
Lehrs - #3	0.003	0.004	0.001
Emergency Generator	0	0.003	0.003
		Project-Related Increases:	1.60
		Project-Related Decreases:	-25.26
		Significance Threshold:	40
		Netting Analysis Required?	NO

[1] Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, $PM_{2.5}$, SO_2, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

[2] The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM_{10} / $PM_{2.5}$: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGCI's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM_{10} and $PM_{2.5}$ factors also assume that 95% of FPM is FPM_{10} and 91% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3.

SO_2: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NOx: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NOx testing has not been performed on the Furnace. The Furnace 2 and 3 NOx emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H_2SO_4 mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SCGI's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[3] Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NOx, $PM_{2.5}$, SO_2, and VOM) are future permitted emissions.

[4] Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1 , #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM_{10} / $PM_{2.5}$: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM_{10} and $PM_{2.5}$ factors also assume that 75% of FPM is FPM_{10} and 53% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO_2: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO_2 concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO_2 concentrations at each Furnace taken from the most recent stack test results.

NOx: As specified by GCD, IV.7.d.ii.

H_2SO_4 mist: Post-project emission factor is based on recent stack testing results of other SGCI Furnaces with SO_2 controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[5] Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)
Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON

Saint-Gobain Containers, Inc.
Dolton Furnace #1 & #2 & #3 Modifications
Project-Related NO_2 Emission Changes

Signature: *MMW* | Date Calc Made Final: *9/13/2012*

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Source	Baseline or Past Actual Emissions (tpy)[1,2]	Post-Project Emissions (tpy)[3,4]	Project-Related Emissions Increase/Decrease (tpy)[5]
Furnace No. 1	143.19	90.87	-52.32
Furnace No. 2	107.91	66.43	-41.48
Furnace No. 3	171.84	64.06	-107.79
Distributors/Forehearths - #1	3.74	7.11	3.38
Distributors/Forehearths - #2	3.21	4.97	1.77
Distributors/Forehearths - #3	3.50	4.79	1.30
Lehrs - #1	0.39	0.75	0.355
Lehrs - #2	0.41	0.63	0.225
Lehrs - #3	0.50	0.69	0.187
Emergency Generator	0	2.646	2.646
		Project-Related Increases:	9.85
		Project-Related Decreases:	-201.59
		Significance Threshold:	40
		Netting Analysis Required?	NO

[1] Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, $PM_{2.5}$, SO_2, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

[2] The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM_{10} / $PM_{2.5}$: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGCI's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM_{10} and $PM_{2.5}$ factors also assume that 95% of FPM is FPM_{10} and 91% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3.

SO_2: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NOx: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NOx testing has not been performed on the Furnace. The Furnace 2 and 3 NOx emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H_2SO_4 mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SCGI's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[3] Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NOx, $PM_{2.5}$, SO_2, and VOM) are future permitted emissions.

[4] Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1 , #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM_{10} / $PM_{2.5}$: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM_{10} and $PM_{2.5}$ factors also assume that 75% of FPM is FPM_{10} and 53% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO_2: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO_2 concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO_2 concentrations at each Furnace taken from the most recent stack test results.

NOx: As specified by GCD, IV.7.d.ii.

H_2SO_4 mist: Post-project emission factor is based on recent stack testing results of other SGCI Furnaces with SO_2 controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[5] Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)
Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON

Saint-Gobain Containers, Inc.
Dolton Furnace #1 & #2 & #3 Modifications
Project-Related CO Emission Changes

Signature: *MMW* | Date Calc Made Final: *9/13/2012*

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Source	Baseline or Past Actual Emissions (tpy)[1,2]	Post-Project Emissions (tpy)[3,4]	Project-Related Emissions Increase/Decrease (tpy)[5]
Furnace No. 1	7.34	13.98	6.64
Furnace No. 2	6.59	10.22	3.63
Furnace No. 3	7.19	9.86	2.66
Distributors/Forehearths - #1	3.14	5.97	2.84
Distributors/Forehearths - #2	2.69	4.18	1.48
Distributors/Forehearths - #3	2.94	4.03	1.09
Lehrs - #1	0.33	0.63	0.30
Lehrs - #2	0.34	0.53	0.19
Lehrs - #3	0.42	0.58	0.16
Emergency Generator	0	1.45	1.45
		Project-Related Increases:	20.43
		Project-Related Decreases:	0.00
		Significance Threshold:	100
		Netting Analysis Required?	NO

[1] Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, $PM_{2.5}$, SO_2, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

[2] The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM_{10} / $PM_{2.5}$: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGCI's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM_{10} and $PM_{2.5}$ factors also assume that 95% of FPM is FPM_{10} and 91% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3.

SO_2: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NOx: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NOx testing has not been performed on the Furnace. The Furnace 2 and 3 NOx emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H_2SO_4 mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SCGI's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[3] Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NOx, $PM_{2.5}$, SO_2, and VOM) are future permitted emissions.

[4] Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1, #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM_{10} / $PM_{2.5}$: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM_{10} and $PM_{2.5}$ factors also assume that 75% of FPM is FPM_{10} and 53% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO_2: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO_2 concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO_2 concentrations at each Furnace taken from the most recent stack test results.

NOx: As specified by GCD, IV.7.d.ii.

H_2SO_4 mist: Post-project emission factor is based on recent stack testing results of other SGCI Furnaces with SO_2 controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[5] Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)
Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON

Saint-Gobain Containers, Inc.
Dolton Furnace #1 & #2 & #3 Modifications
Project-Related H_2SO_4 Mist Emission Changes

Signature: MMW — Date Calc Made Final: 9/13/2012

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Source	Baseline or Past Actual Emissions (tpy)[1,2]	Post-Project Emissions (tpy)[3,4]	Project-Related Emissions Increase/Decrease (tpy)[5]
Furnace No. 1	8.74	6.99	-1.75
Furnace No. 2	7.84	5.11	-2.73
Furnace No. 3	8.56	4.93	-3.63
		Project-Related Increases:	0.00
		Project-Related Decreases:	-8.12
		Significance Threshold:	7
		Netting Analysis Required?	NO

[1] Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, $PM_{2.5}$, SO_2, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

[2] The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM_{10} / $PM_{2.5}$: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGCI's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM_{10} and $PM_{2.5}$ factors also assume that 95% of FPM is FPM_{10} and 91% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3.

SO_2: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NOx: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NOx testing has not been performed on the Furnace. The Furnace 2 and 3 NOx emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H_2SO_4 mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SGCI's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[3] Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NOx, $PM_{2.5}$, SO_2, and VOM) are future permitted emissions.

[4] Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1, #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM_{10} / $PM_{2.5}$: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM_{10} and $PM_{2.5}$ factors also assume that 75% of FPM is FPM_{10} and 53% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO_2: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO_2 concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO_2 concentrations at each Furnace taken from the most recent stack test results.

NOx: As specified by GCD, IV.7.d.ii.

H_2SO_4 mist: Post-project emission factor is based on recent stack testing results of other SGCI Furnaces with SO_2 controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[5] Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)
Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON

Saint-Gobain Containers, Inc.
Dolton Furnace #1 & #2 & #3 Modifications
Project-Related CO_2e Emission Changes

Signature: *MMW* Date Calc Made Final: *9/13/2012*

Checked by: *JGB/BED* Page: *9*

Source	Baseline Actual Emissions (tpy)[1]	Post-Project Emissions (tpy)[2,3]	Project-Related Emissions Increase/Decrease (tpy)[4]
Furnace No. 1 & No. 2 & No. 3	56,347	94,561	38,213
Distributor/Forehearths/Lehrs	14,125	22,790	8,665
Emergency Generator	0	105	105
Scrubber Sorbent Reaction	0	253	253
	CO_2e Project-Related Increases:		47,238
	CO_2e Project-Related Decreases:		0
	CO_2e Significance Threshold:		75,000
	GHG Project Related Increases:		47,199
	GHG Significance Threshold:		0
	Netting Analysis Required?*		NO

* Netting only required if both GHG and CO2e are greater than the applicable thresholds.

[1] Baseline Actual $CO_2(e)$ Emissions from natural gas combustion are calculated using the facility's average natural gas consumption rates (MMscf) during the 24-month baseline period from January 2010 through December 2011. The Tier 1 calculation methodology specified in 40 CFR 98 Subpart C is used. Baseline Actual $CO_2(e)$ Emissions from glass production are calculated using the facility's average material feed rates (ton/yr charged) during the 24-month baseline period from January 2010 through December 2011. The calculation methodology specified in 40 CFR 98 Subpart N is used.

[2] Post-project emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, $PM_{2.5}$, SO_2, and VOM) are future permitted emissions.

[3] Post-Project Emissions are calculated based on natural gas and diesel fuel consumption rates and material feed rates increased in proportion to the increased glass pull rate for Furnaces #1, #2, and #3. Emissions of $CO_2(e)$ from natural gas combustion, diesel combustion, and sorbent injection are calculated according to the methodologies specified in 40 CFR 98 Subpart C; emissions of $CO_2(e)$ from glass production are calculated according to the methodologies specified in 40 CFR 98 Subpart N.

[4] Project-Related Emissions Increase/Decrease = Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)
Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Baseline Actual Emissions (for pollutants regulated under NNSR).

ENVIRON

Saint-Gobain Containers, Inc.
Dolton Furnace #1 & #2 & #3 Modifications
Project-Related GHG Emission Changes

Signature: *MMW* Date Calc Made Final: *9/13/2012*
Checked by: *JGB/BED* Page: *10*

Source	Baseline Actual Emissions (tpy)[1]	Post-Project Emissions (tpy)[2,3]	Project-Related Emissions Increase/Decrease (tpy)[4]
Furnace No. 1 & No. 2 & No. 3	56,302	94,488	38,185
Distributor/Forehearths/Lehrs	14,112	22,768	8,657
Emergency Generator	0	104	104
Scrubber Sorbent Reaction	0	253	253
		GHG Project-Related Increases:	47,199
		GHG Project-Related Decreases:	0
		GHG Significance Threshold:	0
		CO_2e Project-Related Increases:	47,236
		CO_2e Significance Threshold:	75,000
		Netting Analysis Required?	NO

* Netting only required if both GHG and CO2e are greater than the applicable thresholds.

[1] Baseline Actual GHG Emissions from natural gas combustion are calculated using the facility's average natural gas consumption rates (MMscf) during the 24-month baseline period from January 2010 through December 2011. The Tier 1 calculation methodology specified in 40 CFR 98 Subpart C is used. Baseline Actual GHG Emissions from glass production are calculated using the facility's average material feed rates (ton/yr charged) during the 24-month baseline period from January 2010 through December 2011. The calculation methodology specified in 40 CFR 98 Subpart N is used.

[2] Post-project emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, $PM_{2.5}$, SO_2, and VOM) are future permitted emissions.

[3] Post-Project Emissions are calculated based on natural gas and diesel fuel consumption rates and material feed rates increased in proportion to the increased glass pull rate for Furnaces #1, #2, and #3. Emissions of $CO_2(e)$ from natural gas combustion, diesel combustion, and sorbent injection are calculated according to the methodologies specified in 40 CFR 98 Subpart C; emissions of $CO_2(e)$ from glass production are calculated according to the methodologies specified in 40 CFR 98 Subpart N.

[4] Project-Related Emissions Increase/Decrease = Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)
Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Baseline Actual Emissions (for pollutants regulated under NNSR).

ENVIRON

Saint-Gobain Containers, Inc.
Dolton Furnace #1 & #2 & #3 Modifications
Project-Related NO_X Emission Changes

Signature: *MMW* Date Calc Made Final: *9/13/2012*
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Source	Baseline or Past Actual Emissions (tpy)[1,2]	Post-Project Emissions (tpy)[3,4]	Project-Related Emissions Increase/Decrease (tpy)[5]
Furnace No. 1	143.19	90.87	-52.32
Furnace No. 2	107.91	66.43	-41.48
Furnace No. 3	171.84	64.05	-107.79
Distributors/Forehearths - #1	3.74	7.11	3.38
Distributors/Forehearths - #2	3.21	4.97	1.77
Distributors/Forehearths - #3	3.50	4.79	1.30
Lehrs - #1	0.39	0.75	0.36
Lehrs - #2	0.41	0.63	0.22
Lehrs - #3	0.50	0.69	0.19
Emergency Generator	0	2.65	2.65
		Project-Related Increases:	9.85
		Project-Related Decreases:	-201.59
		Significance Threshold:	40
		Netting Analysis Required?	NO

[1] Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, $PM_{2.5}$, SO_2, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

[2] The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM_{10} / $PM_{2.5}$: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGCI's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM_{10} and $PM_{2.5}$ factors also assume that 95% of FPM is FPM_{10} and 91% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3.

SO_2: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NOx: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NOx testing has not been performed on the Furnace. The Furnace 2 and 3 NOx emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H_2SO_4 mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SGCI's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[3] Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NOx, $PM_{2.5}$, SO_2, and VOM) are future permitted emissions.

[4] Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1 , #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM_{10} / $PM_{2.5}$: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM_{10} and $PM_{2.5}$ factors also assume that 75% of FPM is FPM_{10} and 53% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO_2: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO_2 concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO_2 concentrations at each Furnace taken from the most recent stack test results.

NOx: As specified by GCD, IV.7.d.ii.

H_2SO_4 mist: Post-project emission factor is based on recent stack testing results of other SGCI Furnaces with SO_2 controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[5] Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)
Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

ENVIRON

Saint-Gobain Containers, Inc.
Dolton Furnace #1 & #2 & #3 Modifications
Project-Related VOM Emission Changes

Signature: MMW
Date Calc Made Final: 9/13/2012
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Source	Baseline or Past Actual Emissions (tpy)[1,2]	Post-Project Emissions (tpy)[3,4]	Project-Related Emissions Increase/Decrease (tpy)[5]
Furnace No. 1	7.34	13.98	6.64
Furnace No. 2	6.59	10.22	3.63
Furnace No. 3	7.19	9.86	2.66
Distributors/Forehearths - #1	0.21	0.39	0.19
Distributors/Forehearths - #2	0.18	0.27	0.10
Distributors/Forehearths - #3	0.19	0.26	0.07
Lehrs - #1	0.02	0.04	0.020
Lehrs - #2	0.02	0.03	0.012
Lehrs - #3	0.03	0.04	0.010
Emergency Generator	0	0.54	0.54
		Project-Related Increases:	13.66
		Project-Related Decreases:	0.00
		Significance Threshold:	40
		Netting Analysis Required?	NO

[1] Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, $PM_{2.5}$, SO_2, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011.

[2] The Furnace emission factors used to calculate Baseline Actual or Past Actual Emissions are the following:

PM / PM_{10} / $PM_{2.5}$: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGCI's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM_{10} and $PM_{2.5}$ factors also assume that 95% of FPM is FPM_{10} and 91% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3.

SO_2: Emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NOx: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NOx testing has not been performed on the Furnace. The Furnace 2 and 3 NOx emission factors are based on the stack tests performed at each Furnace before or during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H_2SO_4 mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SGCI's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[3] Post-project emissions of pollutants that are regulated under PSD (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) are future projected actual emissions after the project. Post-project emissions of pollutants that are regulated under NNSR (NOx, $PM_{2.5}$, SO_2, and VOM) are future permitted emissions.

[4] Post-Project Emissions are calculated based on the post-project maximum annual pull rates for Furnaces #1, #2, and #3. All other production rates are increased in proportion to the increased glass pull rate across the Furnaces. Post-project Furnace emission factors reflect GCD controls:

PM / PM_{10} / $PM_{2.5}$: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM_{10} and $PM_{2.5}$ factors also assume that 75% of FPM is FPM_{10} and 53% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO_2: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO_2 concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO_2 concentrations at each Furnace taken from the most recent stack test results.

NOx: As specified by GCD, IV.7.d.ii.

H_2SO_4 mist: Post-project emission factor is based on recent stack testing results of other SGCI Furnaces with SO_2 controls while accounting for expected variability of Furnace operation.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

[5] Project-Related Emissions Increase/Decrease = Future Projected Actual Emissions - Baseline Actual Emissions (for pollutants regulated under PSD)
Project-Related Emissions Increase/Decrease = Future Permitted Emissions - Past Actual Emissions (for pollutants regulated under NNSR).

Past actuals equal to baseline actuals ?

ENVIRON

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Baseline Actual / Past Actual Emissions

Process	Material	Baseline / Past Actual Throughput[a]		Emission Factors[b]									Baseline Actual / Past Actual Emissions (TPY)							
		Quantity	Unit	PM	PM_{10}	$PM_{2.5}$	SO_2	NOx	H_2SO_4 Mist	VOM	CO	EF Units	PM	PM_{10}	$PM_{2.5}$	SO_2	NOx	H_2SO_4 Mist	VOM	CO
Furnace #1	Glass	73,431	ton/yr	0.51	0.49	0.47	1.01	3.90	0.24	0.2	0.2	lb/ton	18.74	17.97	17.36	37.02	143.19	8.74	7.34	7.34
Furnace #2	Glass	65,896	ton/yr	0.56	0.54	0.52	1.48	3.28	0.24	0.2	0.2	lb/ton	18.54	17.78	17.18	48.83	107.91	7.84	6.59	6.59
Furnace #3	Glass	71,912	ton/yr	0.59	0.57	0.55	1.99	4.78	0.24	0.2	0.2	lb/ton	21.28	20.42	19.73	71.60	171.84	8.56	7.19	7.19
Furnace #1 - Forehearth / Distributors	Natural Gas	74.7	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmscf	0.28	0.28	0.28	0.02	3.74	--	0.21	3.14
Furnace #2 - Forehearth / Distributors	Natural Gas	64.2	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmscf	0.24	0.24	0.24	0.02	3.21	--	0.18	2.69
Furnace #3 - Forehearth / Distributors	Natural Gas	70.0	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmscf	0.27	0.27	0.27	0.02	3.50	--	0.19	2.94
Material Handling	Material	2,891	lbs of Uncon PM	0.01	0.01	0.01	--	--	--	--	--	lb/lb mat	0.01	0.01	0.01	--	--	--	--	--
Furnace #1 - Lehrs	Natural Gas	7.87	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmscf	0.03	0.03	0.03	0.002	0.393	--	0.02	0.33
Furnace #2 - Lehrs	Natural Gas	8.16	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmscf	0.03	0.03	0.03	0.002	0.408	--	0.02	0.34
Furnace #3 - Lehrs	Natural Gas	10.08	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmscf	0.04	0.04	0.04	0.003	0.504	--	0.03	0.42
Mold Swab - Furnace #1	Solvent	8,674	lbs of material	0.9	0.9	0.9	--	--	--	--	--	lb/lb mat	3.90	3.90	3.90	--	--	--	--	--
Mold Swab - Furnace #2	Solvent	7,929	lbs of material	0.9	0.9	0.9	--	--	--	--	--	lb/lb mat	3.57	3.57	3.57	--	--	--	--	--
Mold Swab - Furnace #3	Solvent	8,679	lbs of material	0.9	0.9	0.9	--	--	--	--	--	lb/lb mat	3.91	3.91	3.91	--	--	--	--	--
Hot End Coating - Furnace #1	TC-100	6,968	lbs of material	0.24	0.24	0.24	--	--	--	--	--	lb/lb mat	0.84	0.84	0.84	--	--	--	--	--
Hot End Coating - Furnace #2	TC-100	6,372	lbs of material	0.24	0.24	0.24	--	--	--	--	--	lb/lb mat	0.76	0.76	0.76	--	--	--	--	--
Hot End Coating - Furnace #3	TC-100	6,908	lbs of material	0.24	0.24	0.24	--	--	--	--	--	lb/lb mat	0.83	0.83	0.83	--	--	--	--	--
Furnace #1 - Mixers	Raw Materials	65,441	lbs of material	0.15	0.07	0.01	--	--	--	--	--	lb/ton	1.24	1.21	1.19	--	--	--	--	--
Furnace #2 - Mixers	Raw Materials	58,719	lbs of material	0.15	0.07	0.01	--	--	--	--	--	lb/ton	1.23	1.21	1.19	--	--	--	--	--
Furnace #3 - Mixers	Raw Materials	64,090	lbs of material	0.15	0.07	0.01	--	--	--	--	--	lb/ton	1.23	1.21	1.19	--	--	--	--	--
												Total Baseline Actual Emissions	76.87	74.51	72.55	157.51	434.69	25.16	21.77	30.99

Notes:

(a) Baseline Actual Emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) and Past Actual Emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, $PM_{2.5}$, SO_2, and VOM) are calculated using the facility's average annual glass production rates (tons pulled) during the 24-month period from January 2010 through December 2011. Emissions are calculated using the production rate over the baseline actual / past actual period applied to the respective emission factor.

(b) Emission factors are taken from the following:

-Glass Furnaces

PM / PM_{10} / $PM_{2.5}$: Emission factors for filterable PM (FPM) are based on the stack tests performed at each Furnace during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single FPM factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect. Total PM (TPM) factor assumes that condensable PM (CPM) is 18.7% of TPM, based on 2010-2011 compliance test results for the group of similar regenerative Furnaces across SGCI's fleet (producing Flint or Georgia Green glass and using 20% - 40% cullet). PM_{10} and $PM_{2.5}$ factors also assume that 95% of FPM is FPM_{10} and 91% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3.

SO_2: Emission factors are based on the stack tests performed at each Furnace during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

NOx: Furnace 1 emission factor is based on compliance testing performed on 6/4/08, since subsequent NOx testing has not been performed on the Furnace. The Furnace 2 and 3 NOx emission factors are based on the stack tests performed at each Furnace during the baseline period (tests conducted 9/29 - 10/1/09 and 7/28 - 7/29/11). To derive a single factor for each Furnace, the factors from the stack tests are weighted based on the relative glass throughput during the period of time over the project baseline when each factor was in effect.

H_2SO_4 mist: Emission factor is derived from the average of stack testing results for the group of similar regenerative Furnaces across SGCI's fleet (producing Flint or Georgia Green glass) over the 2010 - 2011 timeframe.

VOM, CO: Emission factors per AP-42, Section 11.15, Table 11.15-2, 10/86.

-Forehearths / Distributors / Lehrs

Factors from AP-42, Tables 1.4-1 and 1.4-2.

-Mold Swab, Hot End Coating

Emission factors are updated compared to those used previously in CAAPP Permit 95090177 (Conditions 7.2.12.a and 7.3.12.a) and construction permit 07050050, based on updated information regarding operations. Hot end coating factor reflects the use of C4 hoods at the Dolton facility.

- Mixers

Uncaptured emissions are calculated based on a capture efficiency of: 99% using the uncontrolled emission factor shown.
Captured emissions are calculated based on a total dust collector design air flow of: 10,520 cfm
and a collector outlet grain loading of: 0.003 gr/cf

- Material Handling: Emissions are calculated as specified by CAAPP Permit 95090177 Condition 7.6.12.a. Emissions are based on hours of operation and will not increase as a result of the proposed project since raw material handling was operated continuously during the baseline period.

ENVIRON

Signature: MMW
Checked by: JGB/BED

Date Calc Made Final: 9/13/2012

Post-Project Emissions

383 tpd

Process	Material	Post-Project Throughput[a]		Emission Factors[b]									Post-Project Emissions (TPY)							
		Throughput	Unit	PM	PM_{10}	$PM_{2.5}$	SO_2	NOx	H_2SO_4 Mist	VOM	CO	EF Units	PM	PM_{10}	$PM_{2.5}$	SO_2	NOx	H_2SO_4 Mist	VOM	CO
Furnace #1	Glass	139,795	ton/yr	0.29	0.24	0.20	0.55	1.30	0.10	0.2	0.2	lb/ton	20.27	16.78	13.70	38.58	90.87	6.99	13.98	13.98
Furnace #2	Glass	102,200	ton/yr	0.33	0.28	0.24	0.81	1.30	0.10	0.2	0.2	lb/ton	16.86	14.31	12.06	41.45	66.43	5.11	10.22	10.22
Furnace #3	Glass	98,550	ton/yr	0.30	0.25	0.21	1.09	1.30	0.10	0.2	0.2	lb/ton	14.78	12.32	10.15	53.71	64.06	4.93	9.86	9.86
Furnace #1 - Forehearth / Distributors	Natural Gas	142	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmscf	0.54	0.54	0.54	0.04	7.11	--	0.39	5.97
Furnace #2 - Forehearth / Distributors	Natural Gas	99	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmscf	0.38	0.38	0.38	0.03	4.97	--	0.27	4.18
Furnace #3 - Forehearth / Distributors	Natural Gas	96	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmscf	0.36	0.36	0.36	0.03	4.79	--	0.26	4.03
Material Handling	Material	4,660	lbs of Uncon PM	0.01	0.01	0.01	--	--	--	--	--	lb/lb mat	0.02	0.02	0.02	--	--	--	--	--
Furnace #1 - Lehrs	Natural Gas	14.98	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmscf	0.06	0.06	0.06	0.004	0.749	--	0.04	0.63
Furnace #2 - Lehrs	Natural Gas	12.66	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmscf	0.05	0.05	0.05	0.004	0.633	--	0.03	0.53
Furnace #3 - Lehrs	Natural Gas	13.82	mmcf/yr	7.6	7.6	7.6	0.6	100	--	5.5	84	lb/mmscf	0.05	0.05	0.05	0.004	0.691	--	0.04	0.58
Mold Swab - Furnace #1	Solvent	16,514	lbs of material/yr	0.9	0.9	0.9	--	--	--	--	--	lb/lb mat	7.43	7.43	7.43	--	--	--	--	--
Mold Swab - Furnace #2	Solvent	12,298	lbs of material/yr	0.9	0.9	0.9	--	--	--	--	--	lb/lb mat	5.53	5.53	5.53	--	--	--	--	--
Mold Swab - Furnace #3	Solvent	11,894	lbs of material/yr	0.9	0.9	0.9	--	--	--	--	--	lb/lb mat	5.35	5.35	5.35	--	--	--	--	--
Hot End Coating - Furnace #1	TC-100	13,266	lbs of material/yr	0.24	0.24	0.24	--	--	--	--	--	lb/lb mat	1.59	1.59	1.59	--	--	--	--	--
Hot End Coating - Furnace #2	TC-100	9,883	lbs of material/yr	0.24	0.24	0.24	--	--	--	--	--	lb/lb mat	1.19	1.19	1.19	--	--	--	--	--
Hot End Coating - Furnace #3	TC-100	9,467	lbs of material/yr	0.24	0.24	0.24	--	--	--	--	--	lb/lb mat	1.14	1.14	1.14	--	--	--	--	--
Furnace #1 - Mixers	Raw Materials	124,584	lbs of material/yr	0.15	0.07	0.01	--	--	--	--	--	lb/ton	1.28	1.23	1.10	--	--	--	--	--
Furnace #2 - Mixers	Raw Materials	91,070	lbs of material/yr	0.15	0.07	0.01	--	--	--	--	--	lb/ton	1.25	1.22	1.19	--	--	--	--	--
Furnace #3 - Mixers	Raw Materials	87,830	lbs of material/yr	0.15	0.07	0.01	--	--	--	--	--	lb/ton	1.25	1.22	1.19	--	--	--	--	--
Emergency Generator	Diesel fuel	750	kW	0.20	0.20	0.20	0.00738	6.4	--	1.3	3.5	g/kW-hr	0.08	0.08	0.08	0.003	2.65	--	0.54	1.45
Scrubber Silo	Particulate	1,214	1,000 lb material/yr	0.0036	0.0036	0.0036	--	--	--	--	--	lb/1,000 lb	0.002	0.002	0.002	--	--	--	--	--
ESP Dust Silo	Particulate	2,545	1,000 lb material/yr	0.0036	0.0036	0.0036	--	--	--	--	--	lb/1,000 lb	0.005	0.005	0.005	--	--	--	--	--
Total Post-Project Emissions													79.49	70.85	63.27	133.85	242.95	17.03	35.63	51.42

Notes:

(a) Post-project emissions of pollutants that are regulated under Prevention of Significant Deterioration (PSD) (CO, PM, PM_{10}, H_2SO_4 mist, and GHG) are future Projected Actual Emissions after the project.
Post-project emissions of pollutants that are regulated under Non-attainment New Source Review (NNSR) (NOx, $PM_{2.5}$, SO_2, and VOM) are future Permitted Emissions.

(b) Post-Project emission factors are taken from the following:

-Glass Furnace

PM / PM_{10} / $PM_{2.5}$: Post-project emission factors for filterable PM (FPM) from each Furnace are based on the GCD limit [IV.9.c]. Total PM (TPM) factor assumes that CPM is 31% of TPM for Furnace #1, 39.4% of TPM for Furnace #2, and 33.3% of TPM for Furnace #3, conservatively assuming that CPM emissions remain unchanged from the results of the most recent stack tests. PM_{10} and $PM_{2.5}$ factors also assume that 75% of FPM is FPM_{10} and 53% of FPM is $FPM_{2.5}$, consistent with AP-42 Table 11.15-3 for an ESP-controlled Furnace.

SO_2: Post-project emission factors are based on the GCD limit of 50 ppm (for a pre-control SO2 concentration less than 167 ppmv) and on the expected performance of the dry scrubber to be installed as part of the proposed project, given the expected inlet SO_2 concentrations at each Furnace taken from the most recent stack test results.

NOx: As specified by GCD, IV,7,d,ii.

H_2SO_4 mist: Post-project emission factor is based on recent stack testing results of other SGCI Furnaces with SO_2 controls while accounting for expected variability of Furnace operation.

VOM, CO: Factors from AP-42, Table 11.15-2.

-Forehearths / Distributor / Lehr

Factors from AP-42, Tables 1.4-1 and 1.4-2.

-Mold Swab, Hot End Coating

Emission factors are updated compared to those used previously in CAAPP Permit 95090177 (Conditions 7.2.12.a and 7.3.12.a) and construction permit 07050050, based on updated information regarding operations. Hot end coating factor reflects the use of C4 hoods at the Dolton facility.

- Mixers

Uncaptured emissions are calculated based on a capture efficiency of: 99% using the uncontrolled emission factor shown.
Captured emissions are calculated based on a total dust collector design air flow of: 10,520 cfm
and a collector outlet grain loading of: 0.003 gr/cf

- Material Handling: Emissions are calculated as specified by CAAPP Permit 95090177 Condition 7.6.12.a. Emissions are based on hours of operation and will not increase as a result of the proposed project since raw material handling was operated continuously during the baseline period.

- Scrubber Silo and ESP Silo

Emission factors from AP-42, Table 11.26-1 for storage bin loading. Factors conservatively assume $PM = PM_{10} = PM_{2.5}$.

- Emergency Generator

PM, NOx, VOC, and CO factors are based on the allowable limits for Tier 2 engines according to 40 CFR 60.4202(a)(2). NOx factor is based on the NMHC + NOx limit; VOM factor is based on the Tier 1 allowable limit for HC; SO_2 factor taken from AP-42 Table 3.4-1. Factor assumes use of diesel fuel with 15 ppm sulfur content, and conversion factor of 0.608 kg/kw-hr / lb/hp-hr per Note (a) of AP-42 Table 3.4-1. Emissions assume an annual engine runtime of: 500 hr/yr, consistent with USEPA memo "Calculating Potential to Emit for Emergency Generators" (September 6, 1995).

BASELINE ACTUAL GHG EMISSIONS CALCULATIONS

Furnace CO2e = 51,131.67

Subpart C Tier 1 CO_2 Calculation Methodology (Eq. C-1)

$CO_2 = 1x10^{-3} * Fuel * HHV * EF$

Natural Gas

CO_2 =	42,193.49	metric tons	
Fuel =	774,127,785	scf	(based on annual average actual NG usage during baseline period)
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)
EF =	53.02	kg CO2/MMBtu	(default value from Table C-1)

Subpart C CH_4 and N_2O Calculation Methodology (Eq. C-8)

CH_4 or $N_2O = 1x10^{-3} * Fuel * HHV * EF$

CO_2e = Emissions in metric tons/yr * Global Warming Potential

Natural Gas

CH_4 =	0.80	metric tons		
CO_2e for CH_4 =	16.71	metric tons	GWP_{CH4} =	21
N_2O =	0.08	metric tons		
CO_2e for N_2O=	24.67	metric tons	GWP_{N2O} =	310
Fuel =	774,127,785	scf	(based on annual average actual NG usage during baseline period)	
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)	
EF_{CH4} =	1.00E-03	kg CH4/MMBtu	(default value from Table C-2)	
EF_{N2O} =	1.00E-04	kg N2O/MMBtu	(default value from Table C-2)	

Subpart N CO_2 Calculation Methodology for Use of Carbonate-Based Raw Materials

For purposes of estimating baseline emissions, the CO_2 emissions are calculated using the average usage of each carbonate-based material charged to each furnace over the baseline period.

E_{CO2} = 8,897 metric tons

Eq. N-1

$$E_{CO2} = \sum_{i=1}^{n} MF_i * \left(M_i * \frac{2000}{2205} \right) * EF_i * F_i$$

Where:

E_{CO2} = Process emissions of CO_2 from the furnace (metric tons)

n = Number of carbonate-based raw materials charged to the furnace

MF_i = Annual average mass fraction of carbonate-based mineral "i" in carbonate-based raw material "i" (percentage, expressed as a decimal) NOTE: a value of 1.0 can be used as an alternative to data provided by the raw material supplier.

M_i = Annual amount of carbonate-based raw material "i" charged to furnace (tons)

2000/2205 = Conversion factor to convert tons to metric tons

EF_i = Emission factor for carbonate-based raw material "i", (metric ton CO_2 per metric ton carbonate-based raw material as shown in Table N-1 to Subpart N)

F_i = Fraction of calcination achieved for carbonate-based raw material "i", assume to be equal to 1.0 (percentage, expressed as a decimal)

Raw Material	CO_2 Emission Factor (metric tons CO_2/metric ton material)	Tons/Year Charged to Furnace #1	Tons/Year Charged to Furnaces #2	Tons/Year Charged to Furnaces #3
Limestone- $CaCO_3$	0.440	10,473	9,640	10,192
Dolomite- $CaMg(CO_3)_2$	0.477	0	0	0
Sodium-carbonate/ soda ash-NA_2CO_3	0.415	12,532	11,486	12,144

* Average annual usage during baseline period.

The mass fraction of carbonate-based mineral in the raw material (MF_i) was conservatively assumed to be 100% to estimate emissions.

Distributor/Forehearths/Lehrs CO2e = 12,817.90

Subpart C Tier 1 CO_2 Calculation Methodology (Eq. C-1)

$CO_2 = 1x10^{-3}$ * Fuel * HHV * EF

Natural Gas

CO_2 =	12,805.35	metric tons	
Fuel =	234,940,804	scf	(based on annual average actual NG usage during baseline period)
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)
EF =	53.02	kg CO2/MMBtu	(default value from Table C-1)

Subpart C CH_4 and N_2O Calculation Methodology (Eq. C-8)

CH_4 or $N_2O = 1x10^{-3}$ * Fuel *HHV * EF

CO_2e = Emissions in metric tons/yr * Global Warming Potential

Natural Gas

CH_4 =	0.24	metric tons		
CO_2e for CH_4=	5.07	metric tons	GWP_{CH4} =	21
N_2O =	0.02	metric tons		
CO_2e for N_2O=	7.49	metric tons	GWP_{N2O} =	310
Fuel =	234,940,804	scf	(based on annual average actual NG usage during baseline period)	
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)	
EF_{CH4} =	1.00E-03	kg CH4/MMBtu	(default value from Table C-2)	
EF_{N2O} =	1.00E-04	kg N2O/MMBtu	(default value from Table C-2)	

PROJECTED ACTUAL GHG EMISSIONS CALCULATIONS

Furnace CO2e = 85,800.13

Subpart C Tier 1 CO_2 Calculation Methodology (Eq. C-1)

$CO_2 = 1\times10^{-3} * Fuel * HHV * EF$

Natural Gas

CO_2 =	68,803.18	metric tons	
Fuel =	1,262,338,139	scf	(based on projected actual annual production)
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)
EF =	53.02	kg CO2/MMBtu	(default value from Table C-1)

Subpart C CH_4 and N_2O Calculation Methodology (Eq. C-8)

CH_4 or $N_2O = 1\times10^{-3} * Fuel * HHV * EF$

CO_2e = Emissions in metric tons/yr * Global Warming Potential

Natural Gas

CH_4 =	1.30	metric tons		
CO_2e for CH_4 =	27.25	metric tons	GWP_{CH4} =	21
N_2O =	0.13	metric tons		
CO_2e for N_2O=	40.23	metric tons	GWP_{N2O} =	310

Fuel =	1,262,338,139	scf	(based on projected actual annual production)
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)
EF_{CH4} =	1.00E-03	kg CH4/MMBtu	(default value from Table C-2)
EF_{N2O} =	1.00E-04	kg N2O/MMBtu	(default value from Table C-2)

Subpart N CO_2 Calculation Methodology for Use of Carbonate-Based Raw Materials

For purposes of projected actual GHG emissions for the facility, the CO_2 emissions are calculated using the projected usage of each carbonate-based material charged to each furnace in a year.

E_{CO2} = 16,937 metric tons

Eq. N-1

$$E_{CO2} = \sum_{i=1}^{n} MF_i * \left(M_i * \frac{2000}{2205}\right) * EF_i * F_i$$

Where:

E_{CO2} = Process emissions of CO_2 from the furnace (metric tons)

n = Number of carbonate-based raw materials charged to the furnace

MF_i = Annual average mass fraction of carbonate-based mineral "i" in carbonate-based raw material "i" (percentage, expressed as a decimal) NOTE: a value of 1.0 can be used as an alternative to data provided by the raw material supplier.

M_i = Annual amount of carbonate-based raw material "i" charged to furnace (tons)

2000/2205 = Conversion factor to convert tons to metric tons

EF_i = Emission factor for carbonate-based raw material "i", (metric ton CO_2 per metric ton carbonate-based raw material as shown in Table N-1 to Subpart N)

F_i = Fraction of calcination achieved for carbonate-based raw material "i", assume to be equal to 1.0 (percentage, expressed as a decimal)

Raw Material	CO_2 Emission Factor (metric tons CO_2/metric ton material)	Tons/Year Charged to Furnace #1	Tons/Year Charged to Furnaces #2	Tons/Year Charged to Furnaces #3
Limestone- $CaCO_3$	0.440	19,938	14,951	13,968
Dolomite- $CaMg(CO_3)_2$	0.477	0	0	0
Sodium-carbonate/ soda ash-NA_2CO_3	0.415	23,857	17,814	16,642

The mass fraction of carbonate-based mineral in the raw material (MF_i) was conservatively assumed to be 100% to estimate emissions.

* Projected annual usage based on baseline usage x projected glass pull rate/baseline annual average glass pull rate.

Distributor/Forehearths/Lehrs CO2e = 20,680.72

Subpart C Tier 1 CO_2 Calculation Methodology (Eq. C-1)

$CO_2 = 1x10^{-3}$ * Fuel * HHV * EF

Natural Gas

CO_2 =	20,660.45	metric tons	
Fuel =	379,059,160	scf	(based on projected actual annual production)
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)
EF =	53.02	kg CO2/MMBtu	(default value from Table C-1)

Subpart C CH_4 and N_2O Calculation Methodology (Eq. C-8)

CH_4 or $N_2O = 1x10^{-3}$ * Fuel *HHV * EF

CO_2e = Emissions in metric tons/yr * Global Warming Potential

Natural Gas

CH_4 =	0.39	metric tons		
CO_2e for CH_4 =	8.16	metric tons	GWP_{CH4} =	21
N_2O =	0.04	metric tons		
CO_2e for N_2O=	12.08	metric tons	GWP_{N2O} =	310
Fuel =	379,059,160	scf	(based on projected actual annual production)	
HHV =	1.028E-03	MMBtu/scf	(default value from Table C-1)	
EF_{CH4} =	1.00E-03	kg CH4/MMBtu	(default value from Table C-2)	
EF_{N2O} =	1.00E-04	kg N2O/MMBtu	(default value from Table C-2)	

Scrubber CO2e = 229

Subpart C Calculation Methodology for CO2 from Sorbent (Eq. C-11)

$CO_2 = 0.91$ * Sorbent Use * R * $[MW_{CO2} / MW_{sorbent}]$

Soda Ash Scrubbing of SO2

CO_2 =	229	metric tons	
Sorbent Use =	607	ton/yr	(based on projected actual annual production)
R =	1.0	[mol CO_2 released / mol SO_2 captured]	
MW_{CO2}	44		
MW_{Na2CO3}	105.99		

New emergency generator CO_2e = 95

Subpart C Tier 1 CO_2 Calculation Methodology (Eq. C-1b)

$CO_2 = 1x10^{-3}$ * Fuel * EF

Diesel

CO_2 =	95	metric tons	
Fuel =	1,280	MMBtu	(based on projected actual annual production)
EF =	73.96	kg CO2/MMBtu	(default value from Table C-1)

Subpart C CH_4 and N_2O Calculation Methodology (Eq. C-8b)

CH_4 or $N_2O = 1x10^{-3}$ * Fuel * EF

CO_2e = Emissions in metric tons/yr * Global Warming Potential

Diesel

CH_4 =	0.00384	metric tons		
CO_2e for CH_4 =	0.08	metric tons	GWP_{CH4} =	21
N_2O =	0.00077	metric tons		
CO_2e for N_2O=	0.24	metric tons	GWP_{N2O} =	310
Fuel =	1,280	MMBtu	(based on projected actual annual production)	
EF_{CH4} =	3.00E-03	kg CH4/MMBtu	(default value from Table C-2)	
EF_{N2O} =	6.00E-04	kg N2O/MMBtu	(default value from Table C-2)	

Appendix C

Approval of Request to Use Alternative Control Technology

	lb/ton Test 1 (2009)	lb/ton Test 2 (2011)
PM filterable	0.46	
PM cond.		
TPM		
SO_2		
NO_x		

$$PM_{c_1} = \frac{PM_{f_1}}{\frac{PM_{f_2}}{TPM_2}} - PM_{f_1}$$

$$PM_{c_1} = PM_{f_1}\left(\frac{1}{PM_{f_2}/TPM_2} - 1\right)$$

$$PM_{c_1} = PM_{f_1}\left(\frac{TPM_2}{PM_{f_2}} - 1\right).$$

GE Energy

2009 test data.

2.0 SUMMARY OF RESULTS

During the test program, three (3) PM, SO_2, CO_2 and O_2 tests were performed at each of two furnace stack test locations on Furnaces 1, and three (3) PM, NO_x, SO_2, CO_2 and O_2 tests were performed at each of two furnace stack test locations on Furnaces 2 and 3. The following table summarizes the tests results:

Parameters		Furnace 1 Overall Average	Furnace 2 Overall Average	Furnace 3 Overall Average
PM (Filterable)	grains/dscf	0.0153	0.0166	0.0265
	lb/hr	3.14	3.13	3.70
	lb/ton	0.39	0.41	0.46
Sulfur Dioxide	lb/hr	7.30	10.90	17.28
	lb/ton	0.90	1.42	2.13
Nitrogen Oxides	lb/hr	---	26.36	40.23
	lb/ton	---	3.43	4.95

Complete test results can be found in Section 6.0.

3.0 DISCUSSION OF RESULTS

As reported to Illinois Environmental Protection Agency (IEPA) on 9/30/09 by email (see appendix), a total of four complete test runs were performed at the Furnace 1 stack location. Test results from the first test are not included in the test averages at this location. Otherwise, source operation appeared normal during the entire test program. Unit operating data was recorded and retained by plant personnel.

4.0 SAMPLING AND ANALYSIS PROCEDURES

All testing, sampling, analytical, and calibration procedures used for this test program were performed in accordance with the methods presented in the following sections. Where applicable, the *Quality Assurance Handbook for Air Pollution Measurement Systems*, Volume III, Stationary Source Specific Methods, USEPA 600/R-94/038c, September 1994 was used to supplement procedures.

excerpt from document

GE Energy

Gregory J. Rock
Field Engineer 6

ISO 9001 Registered
Quality System

2011 test data

PARTICULATE AND GASEOUS EMISSIONS STUDY

Performed At
Saint-Gobain Containers, Inc.
Furnaces 1, 2 and 3
Dolton, Illinois

Test Dates
July 26 through 29, 2011

Report No.
GE International, Inc. Report ZTNO0342A

Report Submittal Date
September 21, 2011

GE International, Inc.
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2.0 SUMMARY OF RESULTS

During the test program, three (3) PM, SO_2, CO_2, O_2 and sulfuric acid (H_2SO_4) mist tests were performed at each of two furnace stack test locations on Furnaces 1, and three (3) PM, NO_x, SO_2, CO_2, O_2 and sulfuric acid (H_2SO_4) mist tests were performed at each of two furnace stack test locations on Furnaces 2 and 3. The following table summarizes the tests results:

Parameters		Furnace 1 Overall Average	Furnace 2 Overall Average	Furnace 3 Overall Average
Filterable Particulate	grains/dscf	0.0208	0.0259	0.0275
	lb/hr	4.56	5.32	4.77
	lb/ton	0.51	0.64	0.56
Condensible Particulate	grains/dscf	0.0037	0.0054	0.0051
	lb/hr	0.81	1.10	0.85
	lb/ton	0.09	0.13	0.10
Total Particulate	grains/dscf	0.0245	0.0313	0.0326
	lb/hr	5.37	6.42	5.63
	lb/ton	0.60	0.77	0.66
Nitrogen Oxides	lb/hr	---	22.22	35.60
	lb/ton	---	2.68	4.15
Sulfur Dioxide	lb/hr	12.68	14.24	12.67
	lb/ton	1.42	1.72	1.48
Sulfuric acid (H_2SO_4)	lb/hr	0.38	0.34	0.33
	lb/ton	0.04	0.04	0.04

Complete test results can be found in Section 6.0.

3.0 DISCUSSION OF RESULTS

During the first test on Furnace 2, Stack A, the field technician realized during the first twenty-minute traverse that he was not able to sample isokinetically. Sampling on Stack B was paused while the Stack A train was cleaned and re-charged. Sampling commenced with no further interruptions. Source operation appeared normal during the entire test program.

The test samples were analyzed by TEI Analytical, Inc. in Niles, Illinois. The Glass Pull Production Rate of 213.06 ton/day (8.9 ton/hr) for Furnace 1, 199.22 ton/day (8.3 ton/hr) for

Furnace 2 and 205.69 ton/day (8.6 ton/hr) for Furnace 3 was provided by Saint-Gobain Containers, Inc. personnel. Complete process data and the results are appended to the report.

4.0 SAMPLING AND ANALYSIS PROCEDURES

All testing, sampling, analytical, and calibration procedures used for this test program were performed in accordance with the methods presented in the following sections. Where applicable, the *Quality Assurance Handbook for Air Pollution Measurement Systems*, Volume III, Stationary Source Specific Methods, USEPA 600/R-94/038c, September 1994 was used to supplement procedures.

4.1 Determination of Sample Point Locations by USEPA Method 1

This method is applicable to gas streams flowing in ducts, stacks, and flues and is designed to aid in the representative measurement of pollutant emissions and/or total volumetric flow rates from stationary sources. In order to qualify as an acceptable sample location, it must be located at a position at least two stack or duct equivalent diameters downstream and a half equivalent diameter upstream from any flow disturbance.

The cross-section of the measurement site was divided into a number of equal areas, and the traverse points were then located in the center of these areas. The minimum number of points were determined from either Figure 1-1 (particulate) or Figure 1-2 (non-particulate) of USEPA Method 1.

4.2 Volumetric Flow Rate Determination by USEPA Method 2

This method is applicable for the determination of the average velocity and the volumetric flow rate of a gas stream.

The gas velocity head (ΔP) and temperature were measured at traverse points defined by USEPA Method 1. The velocity head was measured with a Type S (Stausscheibe or reverse type) pitot tube and oil-filled manometer; and the gas temperature was measured with a Type K thermocouple. The average gas velocity in the flue was calculated based on: the gas density (as determined by USEPA Methods 3 and 4); the flue gas pressure; the average of the square roots of the velocity heads at each traverse point, and the average flue gas temperature.